

Application No.: 10/685,261  
Appeal Brief Of: September 15, 2005

END92000181US2

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No: 10/685,261  
Applicant: Frank D. Egitto, *et al.*  
Filed: October 14, 2003  
Title: STRUCTURE AND METHOD FOR IMPROVED ADHESION BETWEEN  
TWO POLYMER FILMS  
T.C./A.U.: 1711  
Examiner: Thao T. Tran  
Confirmation No.: 4016  
Notice of Appeal Filed  
Docket No.: Herewith  
Docket No.: END92000181US2

### APPEAL BRIEF

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S I R :

In response to the Office Action dated June 30, 2005, Appellant is submitting this  
Appeal Brief for the above-identified application.

### I. REAL PARTY IN INTEREST

The Real Party In Interest in this matter is the International Business Machines  
Corporation, Armonk, New York, USA.

### II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellant, Appellant's legal  
representative, or Appellant's Assignee that will directly affect or be directly affected by or  
have a bearing on the Board's decision in the pending appeal.

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**III. STATUS OF CLAIMS**

Claims 18-23, 36, and 37 are pending in the application. Claim 18 is the only independent claim in the application. Claims 18-23, 36, and 37, all the claims pending in the application, are appealed.

Claims 18-22, 36, and 37 stand rejected as anticipated under 35 U.S.C. §102 (e) by Berger, U.S. Patent 6,528,145 ("Berger"). Claims 18-23, 36, and 37 stand rejected as anticipated under 35 U.S.C. § 102(e) by Vargo, U.S. Patent 6,232,386 ("Vargo").

Claims 38 and 39 were canceled in appellant's communication of March 25, 2005, and are no longer pending in the application. Consequently, the statements in the body of the Office action of 6/30/2005 that claims 38 and 39 are rejected are irrelevant.

**IV. STATUS OF AMENDMENTS**

There are no pending, unentered amendments after a Final Rejection.

**V. SUMMARY OF CLAIMED SUBJECT MATTER**

In the manufacture of semiconductor devices, it is sometimes desirable to form either a layer of polyimide or a layer of a different polymer over a layer of polyimide. See, specification, page 1, lines 18-27. However, unless time consuming techniques are used, there is generally poor adhesion between the polymer layers. See, page 2, lines 1-11. The application describes a method for improving the adhesion between polymer layers by generating a structure in which there is a silicon-oxide containing layer between the polymer layers. See, page 2, line 16, to page 3, line 4. The claims of the instant application are directed to this structure. See, claims 18-23, 36, and 37. As recited by the broad claim, the structure generally comprises, in order, a substrate; a polyimide layer; a

layer consisting essentially of silicon-oxide; and a layer including a polymeric material selected from the group consisting of polyimides, polyolefins, polyepoxides, polyurethanes, and polycarbonates. See, claim 18.

**VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL**

Both the rejections of record are to be reviewed on appeal. That is, the rejection of claims 18-22, 36, and 37 as anticipated by Berger, and the rejection of claims 18-23, 36, and 37 as anticipated by Vargo are to be reviewed on appeal.

**VII. ARGUMENT**

**A. Legal Standard**

Each of the rejections is an anticipation rejection under 35 U.S.C. § 102. As promulgated by the Federal Circuit, the legal standard for anticipation is as follows:

Anticipation requires that each and every limitation of the claim be disclosed, either expressly or under principles of inherency, in a single prior art reference. *In re Robertson*, 49 U.S.P.Q.2d 1949, 1950-51 (Fed. Cir. 1999). Absence from the reference of any claimed limitation negates anticipation. *Rowe v. Dror*, 42 U.S.P.Q.2d 1550, 1553 (Fed. Cir. 1997). Inherency requires that the missing descriptive material be necessarily present, not merely probably or possibly present, in the prior art. *Rosco, Inc. v. Mirror Lite Co.*, 64 U.S.P.Q.2d 1676, 1680 (Fed. Cir. 2002).

**B. First Rejection under 35 U.S.C. § 102: Berger**

Claims 18-22, 36, and 37 stand rejected under 35 USC § 102(e) as anticipated by Berger, U.S. Patent 6,528,145 ("Berger").<sup>1</sup>

The Examiner relies on Figure 11 of Berger. Office Action of 07/22/04, page 4, line 1-3. Figure 11 shows a composite ceramic substrate (unnumbered), a sealing layer **32**, a ceramic filled polymer layer **98**, and a polymeric surface layer **102**. Berger, column 13, lines 58-63. The Examiner alleges that Berger discloses that the sealing layer **32** may be made of polyimide resin. This assertion is respectfully traversed.

The only description of sealing layer **32** is that it is a "polymeric material" that seals the outside the composite substrate **20**'. Berger, column 12, lines 37-46. The passage apparently relied on by the Examiner, column 9, lines 33-47, describes polymeric surface layer **102**, but not sealing layer **32**. This passage discloses that surface layer **102** may be any of a number of materials, including perfluorinated polyimides, but there is no suggestion that this description also applies to sealing layer **32**. Neither this passage, nor

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<sup>1</sup>In the initial Office Action, claims 17-24 were rejected as anticipated by Berger. Office Action of 07/22/2004, p. 3, ¶ 8 (claims "17-34" in the Office Action is typographical error). In appellant's response, independent claim 17 (now combined with claim 18 to form claim 18, the only independent claim in the application), was amended to recite "a layer consisting essentially of silicon-oxide." Appellant's response of 10/20/2004, p. 3. In the subsequent communication from the Office, this rejection was withdrawn. Office Action of 1/25/2005, ¶ 3. In withdrawing the rejection, the Examiner stated "the rejection of claims 17-24, under 35 U.S.C. 102(e) as being anticipated by Berger et al. (US Pat. 6,528,145), has been withdrawn due to Amendments made thereto." *Id.*

However, in the communication of 06/30/05, the most recent communication from the Office, the Examiner reinstated this rejection, essentially repeating the language of the initial rejection. The Examiner also stated that the rejection of these claims had been "inadvertently left out" of the previous communication, despite that fact that the previous communication indicated that the rejection had been withdrawn. Office Action of 06/30/2005, page 4, lines 10-12.

any other passage cited by the Examiner, discloses that sealing layer **32** may be a polyimide resin.

The Examiner alleges that Berger discloses that the ceramic filler of the ceramic-filled polymeric layer **98** can be silicon dioxide. Office action of 07/22/04, lines 1-3. This assertion is respectively traversed.

The passages relied on by the Examiner, column 6, lines 48-49; column 7, lines 13-14; and column 11, line 63, to column 12, line 4, describe the substrate, not the ceramic-filled polymeric layer **98**. See, Berger, column 6, lines 44-45 ("preferred ceramic materials for the composite substrate") (emphasis added); column 7, line 4 ("I. Ceramic-filled Polymer Substrate") (emphasis added) ; column 12, line 5 ("[a] composite substrate") (emphasis added). However, an indication of the composition of layer **98** is the cross-hatching shown for layer **98** in Figure 11, which generally indicates a synthetic resin or polymer. See, MPEP 608.02.

A ceramic-filled polymeric layer contains a mixture of a polymeric material and a ceramic material. Even assuming, *arguendo*, that ceramic-filled polymeric layer **98** can contain silicon-oxide, a ceramic-filled polymeric layer does not consist essentially of silicon-oxide. As it indicated by its description, "ceramic-filled polymeric layer," and shown by its representation as a synthetic resin or polymer in Figure 11, the layer is primarily a layer of polymer, which contains some ceramic. Further, the transition phrase used in claim 18, "consisting essentially of," excludes ingredients that materially affect the basic and novel characteristics of the product defined in the claim. In the instant application, the layer that consists essentially of silicon-oxide strongly adheres two polymeric layers together. A ceramic-filled polymeric layer, that is, a layer that is primarily a polymer with some ceramic, would not be expected to adhere to layers of polymer together because, as described in the

specification (page 2, lines 1-2), adhesion between layers of polymers is generally poor. And there is no indication in Berger that layer **88** does. According to Berger, "ceramic-filled polymeric layer **98** can be formed to support waveguide **88** and/or channel **90**." Berger, column 13, lines 58-60.

The structure recited in claim 18 differs from the disclosure of Berger by at least the following:

1. Claim 18 recites that first polymeric the layer is polyamide. The Examiner equates with the first polymeric layer with sealing layer **32** of Berger. However, Berger only discloses that layer **32** is a "polymeric material," not that it is a polyimide.
2. Claim 18 recites a layer consisting essentially of silicon-oxide. The Examiner equates this layer with ceramic-filled polymeric layer **98** of Berger. However, the ceramic-filled polymeric layer of Berger does not consist essentially of silicon-oxide.

Because anticipation requires that that each and every limitation of the claim be disclosed, either expressly or under principles of inherency, in a single prior art reference, either of these omissions is fatal to the anticipation rejection. The rejection of claims 18-22, 36, and 37 as anticipated by Berger should be reversed.

### **C. Second Rejection under 35 U.S.C. § 102: Vargo**

Claims 18-24, 36, and 37 stand rejected under 35 USC 102(e) as being anticipated by Vargo, U.S. Patent 6,232,386 ("Vargo").

#### *Claims 18-24, 36, and 37*

The Examiner asserts that Figure 3 of Vargo discloses a composite structure comprising a polymer layer **46** coated with a metal oxide layer **47**, which in turn is bonded

to another polymeric layer **48**. Office Action of 7/22/05, p. 3, ¶ 5. The Office asserts that Vargo teaches the polymers in layer **46** and **48** to be polyimides, polysiloxanes, polyalkylenes, or polyurethanes. *Id.* The Office appears to have equated Vargo's layers **46** and **48** with the polymeric layer and the added layer recited in claim 18, and metal oxide layer **47** with the layer consisting essentially of silicon-oxide recited in claim 18.

Initially, it should be noted that, in addition to the polymeric layer, the layer consisting essentially of silicon-oxide, and the added layer, claim 18 also recites a substrate. The Examiner has not pointed to any element in the composite shown in Vargo's Figure 3, or elsewhere in Vargo, that corresponds to the substrate recited in appellant's claim 18. Nor does Figure 3 show any other structure that could be considered a substrate.

The Examiner does allege that Vargo teaches that his composite can be used to make electrical substrate materials. Office Action of 07/22/05, page 4, lines 1-3. That is, the product itself can be used a substrate. See, Vargo column 36, lines 44-47, and column 66, line 66, to column 37, line 6. However, this is not the same pointing out an element in the composite shown in Figure 3 that corresponds to this element of appellant's claim 18.

A missing element cannot be ignored. Anticipation requires that every element of the claimed invention be present in a single prior art reference. *Richardson v. Suzuki Motor Co.*, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989) (*citing cases*) (emphasis added). Because anticipation requires that that each and every limitation of the claim be disclosed, either expressly or under principles of inherency, in a single prior art reference, this missing element, by itself, is fatal to the Examiner's anticipation rejection. Therefore, the rejection of claims 18-24, 36, and 37 as anticipated by Vargo should be reversed.

Further, as indicated above, the Examiner has equated metal oxide layer **47** with

the layer consisting essentially of silicon-oxide recited in appellant's claim 18. The Examiner relies on Figure 3 and column 35, lines 57-63, and column 36, lines 1-17, which describe preparation of the structure shown in Figure 3, for this disclosure.

The composites of the present invention serve particularly well as substrates for bonding conducting or semiconducting materials (e.g., metals, metal oxides, metal nitrides, metal carbides, metal borides, polyacetylenes, polythiophenes, and polypyrrroles), other polymers (e.g., polyurethanes, polyimides, polyamides, polyphosphazenes, halopolymers, polyolefins, polyacrylates, and polyesters), biological materials (e.g., proteins, enzymes, nucleotides, antibodies, and antigens), and phosphorescent and fluorescent molecules commonly used in sensors and electroluminescent or liquid crystal based displays. This is illustrated in FIGS. 3 and 4.

For example, in FIG. 3, halopolymer 42 is surface treated so that oxygen atoms or oxygen-containing radicals (designated X) **43** are bonded to surface **44**, thus producing oxyhalopolymer **45**. Oxyhalopolymer **45** is then infused with an organic or inorganic material to produce oxyhalopolymer composite **46**. During the infusion process, layer 47 (from about 1 nm to about 1 mm thick) of pure conducting or semiconducting material (e.g., metal, metal oxide, metal nitride, metal carbide, metal boride, polyacetylenes, polythiophene, and polypyrrrole) is disposed on surface **44**. Layer **47** of oxyhalopolymer composite **46** is then reacted with material (designated Y) **48** (e.g., conducting or semiconducting materials, other polymers, biological materials, and phosphorescent and fluorescent molecules commonly used in sensors and electroluminescent or liquid crystal based displays) so that material (designated Y) **48** is bonded to layer **47** of oxyhalopolymer composite **46**.

Vargo, column 35, line 57, to column 36, line 17 (emphasis added).

The passage reproduced above expressly describes layer **47** as a layer of a pure conducting or semiconducting material. As is well known to those skilled in the art, silicon-

oxide is an insulator. Therefore, layer **47** cannot be silicon-oxide.

The Examiner also relies on column 14, lines 13-30 of Vargo for the disclosure that layer **47** can be silicon-oxide. This passage describes the materials that may be disposed in the free volume of the polymer, not the materials used to form layer **47**. See, Vargo, column 12, lines 47-50 ("As indicated above, the composite of the present invention further includes an inorganic or organic material which is disposed in the polymer's free volume, preferably in the polymer's natural free volume.") (emphasis added) Therefore, this passage does not disclose that layer **47** can consist essentially of silicon-oxide.

The Examiner also relies on column 5, lines 52-58, which read as follows:

In addition, by proper choice of the infused inorganic material and chemical functionality at the surface, polymer composites having an inorganic surface which is the same as, similar (sic) to, or different from the infused inorganic material can be prepared. Such materials are useful, for example, in preparing metal oxide/fluoropolymer composites having a pure metal oxide surface.

Vargo, column 5, lines 52-58.

This passage generally describes the preparation of metal oxide/fluoropolymer composites having a metal oxide surface. It says nothing about the composition of layer **47**. The surface metal oxide can be same as, similar to, or different from the infused inorganic material. Even if the polymer were infused with silicon-oxide, the surface could be something else. Therefore, this passage does not disclose that layer **47** can be silicon-oxide.

The Examiner also relies on column 2, lines 7-9, of Vargo. Office Action of 07/22/05, page 4, lines 4-6. This passage reads as follows:

Inorganic-organic hybrid materials have also been prepared by dispersing powdered or particulate forms of inorganic materials within various polymeric matrices.

Vargo, column 2, lines 7-9.

This passage, from the Background of the Invention, is a general disclosure the inorganic/organic materials have been prepared in which the inorganic material is dispersed within a polymer matrix. It says nothing about a layer on the surface of such a material and nothing about silicon-oxide. Therefore, this passage does not disclose that layer **47** can be silicon-oxide.

Of the passages relied on by the Examiner, three are concerned with the materials that are disposed within a polymer matrix, rather than in a layer on the surface of the polymer matrix. Even if one of these passages could be construed to suggest that layer **47** could be silicon-oxide, the fourth passage expressly discloses that layer **47** is a layer of pure conducting or semiconducting material. Because silicon-oxide is an insulator, layer **47** cannot be a layer of silicon-oxide.

Therefore, the following limitations are missing from the disclosure of Vargo.

1. Claim 18 recites a substrate. The Examiner has not pointed out any structure in Vargo that corresponds to the substrate.
2. Claim 18 recites a layer that consists essentially of silicon-oxide. Layer **47** of Vargo, which the Examiner equates with this layer, cannot be silicon-oxide. Vargo expressly discloses that layer **47** is a layer of conducting or semiconducting material, and silicon-oxide is an insulator.

Because anticipation requires that that each and every limitation of the claim be disclosed, either expressly or under principles of inherency, in a single prior art reference, either of these omissions is fatal to the anticipation rejection. The rejection of claims 18-23, 36, and 37 as anticipated by Berger should be reversed.

*Claim 19*

Because the Examiner has not pointed out a substrate, it is not possible tell whether the Examiner has equated layer **46** in Figure 3 with the polymeric layer recited in claim 18 or layer **48** with the polymeric layer recited in claim 18. However, layer **46** cannot be a polyimide. As is apparent from column 35, line 57, to column 36, line 17 (reproduced above), layer **46** is expressly described as an "oxyhalopolymer composite **46**," which is derived from halopolymer **42**. Halopolymers are described at column 7, lines 6-42, of Vargo. Polyimides are not included in the list of halopolymers.

"Non-halo polymers" are defined as polymeric bulk materials other than halopolymers. Vargo, column 6, lines 13-14 (emphasis added). Thus, Vargo has defined "halopolymers" and "non-halopolymers" as two distinct, mutually exclusive groups of polymers. Column 7, lines 53-65, presents a list of "suitable organic non-halopolymers" which includes polyimides. Because (1) layer **46** is an oxyhalopolymer derived from halopolymer **42**, layer **46** cannot be a polyimide because polyimides are "non-halopolymers." Thus, instead of supporting the Examiner's assertion that layer **46** can be a polyimide, column 7, lines 53-65, the passage on which the Examiner relies, makes it apparent that layer **46** cannot be a polyimide.

Although the Examiner has not expressly indicated whether layer **46** of Vargo corresponds to appellant's polymeric layer or appellant's added layer, appellant's claim 19 recites that both the polymeric layer and the added layer are polyimide. Because layer **46**

of Vargo cannot be a polyimide, this limitation is also missing from Vargo. For this additional reason, the rejection of claim 19 as anticipated by Vargo should be reversed.

**D. Response to the "Examiner's Response"**

In the most recent communication, the Examiner makes the following arguments.  
Office Action of 06/30/05, page 4, lines 8-18.

1. The Examiner alleges that Vargo does teach the use of non-halopolymers, such as polyimide (see column 7, lines 42-55).

This passage of Vargo is being read out of context. Although it discloses polyimides, it says that polyimides are "suitable organic non-halopolymers." Vargo, column, lines 54-55. As discussed above layer **46** is an oxyhalopolymer layer derived from a halopolymer layer. Vargo has defined halopolymers and non-halopolymers as two mutually exclusive groups of polymers. Vargo, column 6, lines 13-14. When read in context with the rest of the disclosure of Vargo, this passage actually shows that layer **46** cannot be a polyimide.

2. The Examiner alleges that Vargo does teach that the metal oxide layer is a network of silicon-oxide or silica (see column 14, lines 13-30).

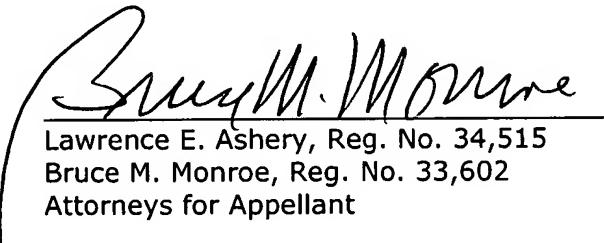
This passage of Vargo is being read out of context. At column 12, lines 45-50, Vargo discloses that "the composite of the present invention further includes an inorganic or organic material which is disposed in the polymer's free volume, preferably in the polymer's natural free volume." (emphasis added) The disclosure cited by the Examiner (Vargo, column 14, lines 13-30) discloses that the silica network is one of numerous material that may be disposed in the polymer's free volume. As discussed above, a layer in which silica is disposed in a polymer's free volume is not a layer that consists essentially of silicon-oxide.

**E. Conclusion**

For the reasons discussed above, neither Berger nor Vargo anticipates the claims pending in appellant's application. Therefore, the Examiner's rejection of claims 18-22 and 36-37 as anticipated by Berger, and claims 18-23 and 36-37 as anticipated by Vargo, should be reversed, and such action is earnestly solicited.

Respectfully submitted,

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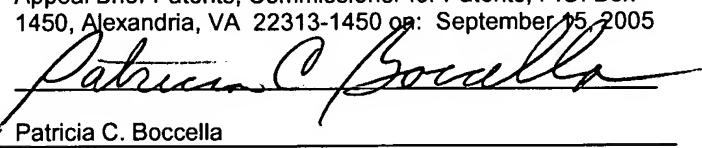
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Patricia C. Boccella

**VIII. CLAIMS APPENDIX**

1.-17. Cancelled

18. A composite structure comprising, in order:

a substrate;

a polymeric layer including a first polymeric material

in which the first polymeric material is a polyimide;

a layer consisting essentially of silicon-oxide; and

an added layer including a second polymeric material selected from the group consisting of polyimides, polyolefins, polyepoxides, polyurethanes, and polycarbonates.

19. The structure of claim 18 in which the second polymeric material is a polyimide.

20. The structure of claim 18 in which the substrate is an integrated circuit device and the second polymeric material is a polyepoxide.

21. The structure of claim 20 additionally comprising a chip carrier adjacent to the added layer.

22. The structure of claim 18 additionally comprising a layer of adhesion promoter between the silicon-oxide containing layer and the added layer.

23. The structure of claim 22 in which the adhesion promoter is selected from the group consisting of 3-amino-propyl-tri-ethoxy-silane, 3-glycidoxy-propyl-tri-methoxy-silane, N-(2-amino-ethyl)-3-amino-propyl-tri-ethoxy-silane, 3-amino-propyl-tri-methoxy-

silane, N-(2-amino-ethyl)-3-amino-propyl-tri-methoxy-silane, 3-isocyanato-propyl-tri-ethoxy-silane, 10-amino-decyl-tri-methoxy-silane, 11-amino-undecyl-tri-methoxy-silane, n-propyl-tri-methoxy-silane, and phenyl-tri-methoxy-silane.

24.-35. Cancelled

36. The structure of claim 20 in which the added layer additionally comprises solid particles of a thermally conductive and electrically insulating material.

37. The composite structure of claim 21 in which the added layer comprises solid particles of a thermally conductive and electrically insulating material.

38.-39. Canceled

**IX. EVIDENCE APPENDIX**

None.

**X. RELATED PROCEEDINGS APPENDIX**

None